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CHEAP DRUGS, OR SOME OF THE FACTORS INFLUENCING THE QUALITY OF VEGETABLE DRUGS.[1]

By Henry Kraemer.

While the earlier records of trade show that adulteration and substitution of articles of commodity were practised, it is very probable that this was not done because of the demand for a cheap article, but that the needs for the article might be met, particularly when the supplies were low. It is also probable that competition was instrumental in reducing prices, and that this was followed by the cheapening of the products.

To-day there is a great demand for cheaper articles, or "something just as good," and he is an exemplary merchant who can say, "we give you what you ask for regardless of our pecuniary interests, and we make quality the first consideration and price secondary in all our dealings."

There probably has never been a time when drugs of good quality could be so easily obtained in most cases as to-day. But as Dr. Rice said: "A great many members of our profession, it is feared, are afflicted with a chronic willful blindness in regard to purity and genuineness of drugs; many, at least, seem to care but little about the quality of the articles they receive, so long as they appear to be genuine and are salable."

A great many are paying the best prices for the poorest articles, as aloes, buchu, sarsaparilla, calamus, ginger, etc., and they do not

[1] Read at the Pharmaceutical Meeting of the Maryland College of Pharmacy, February, 1902.

seem to know it. They accept the goods and complain simply of deterioration, without even ascertaining the commercial varieties. There are others, however, who cannot get drugs too cheap and they pay as little as possible for anything that may resemble the genuine and can be sold for it. It is self-evident that they who regulate their purchases on the basis of price alone will have offered to them deteriorated, admixed, adulterated and sophisticated goods, some of which are most ingenious products.

While it is true that there are some vegetable drugs that are not always easy to obtain in any quantity of satisfactory quality, such as pilocarpus, ergot, cannabis indica, and possibly others, still the majority of drugs may be obtained of good quality, providing the proper sources are sought and the worthless rejected, in season and out of season, and not accepted on any plea of the jobber, or because of lack of courage on the part of the retail pharmacist. The latter must, however, be careful to inquire into the quality of the drugs he is likely to purchase before he investigates their prices. To talk of prices before knowing the quality of drugs places the pharmacist in an unfortunate light, and is likely to deceive the wholesale druggist. Then, too, we must all appreciate that the consumer will in nearly all instances prefer the best quality, providing he is not led to believe that something else will answer just as well. It needs no argument to show that, in cases of serious illness, both the interests of the physician and the patient demand the best obtainable, and the latter is perfectly willing, in most instances, to pay for it. In other words, this is a matter of education when dealing with the public, and of having a thorough understanding with the wholesale druggist.

This brings us to the consideration of our subject, namely, "cheap drugs, what they are, and what causes them to be cheap." While now and then one may obtain a drug of an unusually good quality at a low price, still, as a rule, cheap drugs are inferior drugs. Of the various causes that make them inferior the following may be mentioned:

(1) Lack of knowledge or want of care in collecting them.

(2) Carelessness in drying and caring for them.

(3) Insufficient care in garbling and preparing them for the market.

(4) Inattention in preserving them and storing them

(5) Accidental admixture in the store.

(6) Adulteration or admixture of other substances.

(7) Substitution of other drugs.

I propose to devote particular attention to the first four causes, as much more attention has in recent years been directed to adulterations and substitutions than the other causes, which I am sure are equally deserving of our careful consideration.

(1) The U. S. Pharmacopœia designates in a number of instances the age that plants shall be to yield the official drugs, as digitalis and hyoscyamus, and in some instances states at what time of the year they shall be gathered, as in the case of taraxacum and castanea, and in one instance even the locality in which they shall be grown, as Cannabis Indica. This constitutes a most important part of the definition, and will no doubt become more general as our knowledge of this subject increases. It should be mentioned in this connection, however, that the period in the life-history of the plant, when the medicinal principles are either in greatest amount or most efficient, should be mentioned rather than the season or the month, as these principles change with the life-period of the plant, and are independent of the seasons, the life-period varying with the particular locality and climate in which the plant grows.

Conium and digitalis not infrequently flower the first year, and while the drugs yielded by them may not be as active as those obtained from biennial plants, still one cannot say what cultivation may not accomplish in changing the character of the drug.

Then, too, we are apt to think of the plant as being inactive during the winter season, whereas most important changes of its constituents are continually going on, the nature of which in only a few instances and in a most general way have we a knowledge. For instance, inulin-containing plants have this principle in greatest amount from four to six weeks after the plant dies down, or from four to six weeks prior to the beginning of its vegetative activities. During the winter, as during the summer, larger amounts of other carbohydrates are present. In the same way starch-containing barks, roots and rhizomes yield before and after this quiescent period various other carbohydrates and oily products.

As a result of some thought along this line I have formulated the following general rules for the collection of various drugs:

(1) Roots, rhizomes and barks should be collected immediately before vegetative-life processes begin (in the spring), or immediately after the vegetative processes cease (usually in the fall.)

(2) Leaves should be collected when the CO_2 assimilation process is most active. Usually about the time of development of the flowers and before mature development of fruit and seed.

(3) Flowers should be collected prior to or just about the time of pollination.

(4) Fruits should be collected near the ripening period (*i.e.*, full-grown but unripe.)

(5) Seeds should be collected when fully matured.

As showing the influence which the time of collection has on the quality of drugs and necessarily on the price, the following illustrations may be given: It is well known that when the fruits of conium are green they will yield over 3 per cent. of coniine, but when they change to yellow, the alkaloid diminishes rapidly in quantity, and therefore much of the commercial drug will not yield 1 per cent. of coniine. The same thing may be said of santonin: when the flower-heads are unexpanded they will yield over 3 per cent. of santonin; but just so soon as the flower matures there is a rapid disappearance of the anthelmintic principle. Dealers in insect flowers (flores pyrethri) know that those gathered when the flowers are closed produce the finest and most powerful insect powder, and it is worth nearly twice as much as that made from the half-closed or open flowers. Podophyllum should be collected in the spring when the plant is just coming out of the ground, the resin content being nearly twice as much at this time as at others. Geranium, likewise, should be gathered early in the spring prior to the flowering period. In a general way, we may say that roots and rhizomes should be compact, hard and heavy, instead of being light and having a loose and spongy texture.

It is also important to remember that some of the compositæ have two flowering periods in one year, as taraxacum and anthemis. Flowers of the first crop of anthemis are larger, whiter than those of the second crop, and command fancy prices. In the case of taraxacum this factor has probably not been considered, and may account for certain of the difficulties in obtaining a medicinally active drug.

It may be that the variation in quality of some of the commercial aconite is due to improper drying or extraction of the active principles; still there is no doubt but that much of the trouble with this drug is due to the variation in the time of collection in various countries as well as to its being collected from other species. In

England the tuber is collected in autumn from cultivated plants after the overground parts have died down, whereas, in Germany, the tubers are collected from wild plants during the flowering period, this being done to distinguish the particular species yielding the drug. The commercial drug may consist, then, of partially exhausted summer tubers, autumn tubers, or a mixture of both.

No doubt, much of the early opposition to *Rhamnus purshiana* as compared to *Rhamnus frangula* was due to the collection of the former at improper seasons as well as to the product being collected from other species of Rhamnus. It is well known that wild-cherry bark varies according to its position on the tree. Then, too, collectors are not always able to distinguish the species yielding the official bark. Stoeder has made the interesting observation that the pomegranate bark yielded by trees with white flowers is preferred by the natives of Java; next in value is the bark of the trees with red flowers, which are most common in Java and Europe; lastly, there is the variety with black flowers producing a bark which is still less valuable.

The age of the plant influences the nature of its products in some instances as in the case of coca, there being a slight increase in the amount of alkaloids produced in the leaves of the plant up to the age of about ten years; after twenty years there is a diminution in alkaloids, although the yield is fair in plants thirty to forty years old.

The position of leaves, as well as age, in influencing the nature and amount of active constituents, offers a most fertile field for investigation. In the case of eucalyptus, the product of a tropical tree, the Pharmacopœia specifies the leaves produced on older parts of the plant. In herbs it directs in a number of cases that the leaves and flowering tops be used. It is likely that there is a difference in the constituents of the leaves found on different parts of the same plant: for instance, in sumach, the upper leaves contain a larger proportion of tannin in June than the lower leaves, and as the season advances the decrease in tannin in the upper leaves is also much less than in the lower leaves. It is not unlikely that in this climate the older leaves of herbs, which are more or less withered and imperfect, are like autumn leaves deficient in medicinal activity.

The influence of the weather in affecting the quality of drugs is seen in certain instances. Bad weather at the time of harvesting of fennel will produce a drug having the appearance of an exhausted

fennel. Hedeoma, that is grown during a moderately dry season, produces a larger quantity of oil than when grown in a rainy season. On the other hand, a dry season is very unfavorable to the growth of certain drug-yielding plants as chamomile, causing a serious falling off in supply and a double increase in price.

It is well known that in the propagation of plants there is a difference in some instances in those produced from cuttings and those from seedlings. It is said that when rhubarb was first cultivated in England, seedling cultivation was employed, and the result was a rhubarb of inferior quality, which was greatly improved by propagation from offsets.

While we may not be able to make extended generalizations, it must be apparent, from the facts here presented, that the subject of the proper collection of vegetable drugs is of prime importance, and is deserving of the careful consideration of us all.

(2) Carelessness in drying and caring for drugs after they are gathered is a more frequent cause of inferiority than is commonly supposed. Quercus alba, when properly dried, has a refreshing odor and is very astringent. Kino is much altered if the juice is boiled prior to drying. Of course, where drugs are exposed to the weather for their preparation for the market the conditions are more difficult to control, but even here good judgement and care will save the material. In the distillation of lavender flowers, dry weather is selected for the work, as otherwise the spikes are less fragrant.

Preparations made from the fresh or green drug are considered more valuable in some cases than those made from the dry drug, and command twice the price of the latter. It is probable, that there is something in the supposition that the active principles are in a combination in nature more efficient than when otherwise combined or extracted. Unfortunately, experiments made to determine the relative value of the preparations of the dry and green drug have not been made upon specimens otherwise identical. One cannot take a fresh drug and compare its value with a commercial article, as the latter may vary considerably.

In some cases the Pharmacopœia specifies that the drug shall be kept a certain length of time before being used, as in the case of frangula. A similar specification should be made in regard to Rhamnus purshiana, but since the result of the changes on keeping are now ascertained, and since a similar effect may be obtained by

heating the bark at 100° C. for forty-eight hours, this specification seems no longer necessary.

In some drugs a sort of ripening process takes place in the drying, as in tobacco and vanilla. In still others a marked deterioration takes place if they are placed in heaps and allowed to fer ment, as lavender and most other drugs yielding essential oils. Furthermore, in the preparation of oil of peppermint, the yield of oil is greater and the quality superior if the plants are allowed to dry and are distilled immediately or soon after drying.

Quite a number of drugs are not infrequently observed in commerce in a moldy condition, as taraxacum, veratrum viride, maranta, aconite, etc. The question as to what influence this mold has on the quality of the drug has not been cleared up. Some experiments that are being carried on at the Philadelphia College of Pharmacy may enable us to say something about this later. More than twenty-five years ago Dr. Squibb called attention to the fact that micro-organisms appeared to destroy the active principles in belladonna, and said that "if this be true of aconite, then moldiness would be a cause of inertness, as it is frequently seen moldy on arriving here, though the appearance of the mold soon disappears under the skilful hands of an energetic salesman." It should be stated, however, that a microscopic examination will soon decide the question as to whether a drug has been moldy or not.

The U. S. Pharmacopœia is very specific in stating that certain drugs should be carefully dried, as ergot, cantharides, etc. The British Pharmacopœia in the definitions of most of the drugs speaks of them as the dried drug. This is a very important matter and one deserving of very careful consideration, particularly in the case of seeds, fruits containing seeds, and any other product, as ergot, possessing, dormant life. While I have no results to present, I am inclined to believe that there is a marked difference in the therapeutic value of drugs in which the life is quickly destroyed and those in which the vitality is allowed to ebb out slowly. Ricinus seeds would be interesting material for investigation, the question being whether the oil obtained from a lot of seeds in which 80 or 90 per cent. are capable of germinating is not bland and agreeable and yet possessed of all the purgative properties of the oil ordinarily sold, as compared to that obtained from seeds dried at 50 or 60° C. Investigations have shown that in fennel fruits, which are the richest in volatile oil, from

70 to 80 per cent. are capable of germination. Ergot is ordinarily supposed to retain its virtues not longer than a year, yet it has been suggested that if ergot be dried in thin layers and the last traces of moisture removed, by exposure over lime or sulphuric acid, and then stored in corked yellow bottles, it will retain its superior quality for several years.

(3) A third cause affecting the quality of drugs is the contamination naturally occurring with the drug and which has not been removed in the preparation of the drug for the market. In the trimming of the roots and rhizomes there is a disposition in many instances to leave quite a quantity of the overground stem, as in aconite, senega and veratrum viride. I have examined aconite containing as much as 4 to 5 per cent. of stems, and in belladonna found over 6 per cent., while in ipecac nearly 3 per cent. was found.

In other cases the earth is not removed, and in geranium I have found nearly 10 per cent. of fine refuse matter.

There is a growing tendency to collect the smaller roots with the root bark, as in gossypii radicis cortex and rubus.

In some rhizomes the roots are removed or are present in excessive amounts. The question of ascertaining the relative value of roots and rhizomes is an interesting subject for investigation. Drs. Dohme and Schmidt have done some work on hydrastis and found the roots less active than the rhizome, though still valuable. It was questioned twenty years ago whether the Pharmacopœia was justified in admitting the roots with the rhizome of veratrum viride. The German Pharmacopœia as well as our own Pharmacopœia admits both rhizomes and roots, although considerable veratrum is imported consisting entirely of rhizome. The U.S.P. specifies that podophyllum consists of rhizome and roots, yet it is doubtful if the roots are ever seen in the commercial article. On the other hand I have seen cypripedium, in which over 50 per cent. consisted of roots and the remainder consisted of rhizome with roots attached.

At the present time a large number of drugs are sold in a compressed form. This is done to reduce their bulk and thereby reduce the cost of freight and space in storage. While there is no special objection to this method, unless there is greater liability of the drug to become moldy, still it has been pointed out in the case of cannabis indica that the compressed drug called flat or Bombay ganjah, is an inferior product to the loose or "round-bundled drug," known

as Bengal ganjah. Holmes has therefore suggested that the latter be made official. This is probably due to the fact that an inferior drug is more likely to be used, because it is not so readily detected.

More than ten years ago a patent was taken out to grind the chips and sawings produced in cutting rhubarb root, and after mixing the powder with some adhesive substance, as gum arabic, the mass was then pressed or molded into the desired shape. While the medicinal quality of the drug in this form may not be impaired and is supposed to form a more stable product, still the method invites admixture of other substances.

While it may be disputed that commercial drugs are at present inferior to those formerly sold, it is a lamentable fact that the retail pharmacist does not, as formerly, go over his drugs and select the portions fit for use, rejecting the inert and damaged material. It is claimed that he has not the time for garbling of drugs, and we may well ask, "Who has the time?" Most pharmacists are purchasing their drugs in a broken or powdered condition, and while it cannot be denied that the latter may be obtained of a first-rate quality from some quarters, still it is admitted that drugs in this condition are more likely to be adulterated and of inferior quality; hence the necessity for a more intimate knowledge of this subject.

Modern methods of commerce require the progressive pharmacist to equip himself in order that the integrity of the profession be maintained and benefit accrue to humanity at large. While there are unusual opportunities for deception there have never been better facilities for its detection.

(4) The Pharmacopœia not only considers the subject of the collection of drugs, how they shall be dried and what portions shall be removed, as in aspidium and scilla, but also states how they shall be preserved and limits their time of keeping.

While it is generally considered that most drugs deteriorate on keeping, still this depends largely upon the manner of their preservation. Thus the Pharmacopœia limits the time of keeping of ergot and states how it shall be preserved; still a number of writers call attention to the fact that, if properly prepared and preserved, the time of keeping may be very much extended. In order to preserve ergot, Grover proposed the removal of the oil, and Moss found the drug thus treated to retain its therapeutic value for six and a half years. Zanon suggests placing the drug in alternate layers with sand and

keeping it in a closely sealed jar. Others grind the fresh ergot and preserve with chloroform in paraffin paper, while others first extract the oil with alcohol or ether. Lately it has been proposed to keep the drug by the use of formaldehyde. As to what influence the latter has on the therapeutic value of the drug has not been stated.

In the preservation of vegetable drugs it is necessary to consider the influence of temperature, air, moisture, the attacks of insects and, possibly, light.

It is of the first importance that the temperature in the room or part of the store devoted to the storage of dry drugs shall be not more than 60–70° F. and nearly uniform throughout the year. Drugs containing volatile principles require to be kept in air-tight containers, as the labiate and composite herbs and wild-cherry bark.

Air-tight tin cans are probably the most economical and satisfactory containers for the purpose, and Lloyd has suggested painting the edges of the cans with melted beeswax. Drugs are sometimes stored in wooden boxes or in drawers. This method is objectionable, not only because they are liable to deteriorate, but because the odors are communicable from one to the other. The storage of drugs in parcels is the worst form of preservation, particularly, as is usually the case, when the different parcels are stored together.

Those drugs that are difficult to dry, as the inulin-containing drugs, should be kept in containers having a number of apertures, to allow evaporation to take place. Unless provision of this kind is made, molding of the drug may develop. From experiments that I have made I have no doubt but that the spores of ustilago will develop on any drug, the reserve materials of which are chiefly carbohydrates.

The preservation of drugs against the attacks of insects is, unfortunately, overlooked. Most drugs are subject to their depredations, and are usually attacked by the insects in the larval stage. These insects belong chiefly to the Lepidoptera, Coleoptera and Diptera. The Lepidoptera are the most destructive, and include principally Tinea zea, or cornmeal moth, which, during its larval (the caterpillar or grub) stage, is known to attack aconite, capsicum, ergot, lappa, linum, rheum, taraxacum and many other drugs. Among the Coleoptera may be mentioned various members of the Ptinedæ, as Ptinus brunneus, Anobium paniceum and Lasioderma serricorne, which attack the spices chiefly, as capsicum, cinnamon and pimenta.

Chief among the Diptera is Trypeta arnicivora, which is found in arnica flowers.

For the destruction and prevention of the attacks of these insects a number of substances and methods have been employed, the simplest method of all being to expose the drug to a temperature of about 100° C. This method is, however, open to objection, as there is liability either to decomposition or loss of active principle. A weak solution of carbolic acid has also been suggested but, of course, this is also objectionable. Camphor and tar-camphor have been employed, but it is doubtful if they should be used, unless in the case of animal drugs. In some instances, as with nutmeg and ginger, the drug is sprinkled in the drying-room, and when packed for market, with quicklime. Benzine and carbon disulphide have been proposed, but these are of a disagreeable odor as well as inflammable. Ether has been suggested, but it is very volatile and inflammable. The use of formaldehyde should proceed slowly until it is certain that it has no harmful effects, especially when used in the preservation of herbs used for teas for children, and orris root which is used for teething infants. The use of chloroform as a preservative has been sanctioned by the U.S.P. in the case of ergot, and is probably the best preservative that has been proposed.

It is extremely important to know what to do with drugs that have become worm-eaten. Recently it has been suggested to kill the larvæ, and then sift them out. This may be done in cases where the active principle is unimpaired and is to be extracted. Schimmel & Co. have shown that the essential oil of nutmeg is apparently not altered, even though obtained from worm-eaten seeds. In fact, the commercial oil is largely manufactured from the worm-eaten seeds obtained in Holland by garbling. But where the drug itself is to be used, the drug so affected should not be used. Who can determine what the effect on an open sore would be of a poultice of flaxseed containing thousands of larvæ of Tineæ? In the light of modern hygiene we should be as scrupulous in our selection and care of flaxseed and mustard as we are of drugs otherwise used in prescriptions. Even in the giving away of licorice root to children we should be careful to hand out only good solid pieces. Recently, Sawyer has stated that the mite found in vanilla bean does not unfit it for its various uses. This is, however, doubtful, particularly where it is to be used directly in the material to be flavored.

(5) Additional admixture in the store or warehouse is a subject that I do not need to dwell upon. Many admixtures undoubtedly arise in this way, for it is only in some such manner as this that the presence, for instance, of allium in asclepias could be accounted for.

On account of the limited time at my disposal, and also because this subject has been so frequently and generally considered, I merely wish to give one thought in connection with the subject of admixture, sophistication, adulteration and substitution.

The drugs coming from foreign countries are examined at the customhouse before they are admitted, and the spurious ones are likely to be rejected. This has been most beneficial to the commerce of drugs in increasing their quality. Collectors and distributors cannot afford to have the cases of rejected goods thrown back on their hands, or finally sold in some quarters at 50 per cent. under current rates. Foreign dealers have, therefore, learned the wisdom of supplying the better grades of drugs, and adulterated specimens, as of opium, are becoming rare. Inferior drugs do, however, sometimes find their way into the market. While it is believed that considerable laxity has prevailed in the Appraiser's Department, still this inspection on the whole has tended to improve the quality of imported drugs.

From a limited observation I am inclined to consider that American drugs are equally, if not more, inferior in quality as a rule than those imported. It seems to me that if an internal Governmental inspection could be made of our domestic drugs, it would have a most beneficial influence on their quality.

I am aware of the difficulties attending legislation of this kind, and of some of the reprehensible practices of those vested with the authority of the law; still progress is being made, and the attitude of the Board of Pharmacy in New York State is commendable in so far as it applies to the retail pharmacist there; but this does not seem to reach the bottom of the trouble. In my opinion there should not only be careful and rational inspection of the goods of the retail pharmacist, but also of the products of the jobbers and collectors.

As things are conducted at present, the main responsibility lies with the retail druggist; and while I do not deem it advisable to reduce his responsibilities, still the more all concerned share in this responsibility, the greater and more rapid will be the improvement,

in quality and uniformity, in the strength of drugs and their preparations.

Finally, I refer you to the notes by Dr. Squibb on rhubarb in the Proceedings of the American Pharmaceutical Association as being admirable essays, in that they show the responsibility of the pharmacist in buying drugs and making preparations therefrom. They contain a lesson which has been learned well by a few successful pharmacists and manufacturers, but the great rank and file have not appreciated the fine points, and the result has been that physicians who at first prescribed a few of the special products of manufacturers because they knew the care and attention which was being devoted to their manufacture, now are specifying certain manufacturers' products for nearly all the ingredients which they need in their prescriptions. This will be done until pharmacists generally learn the lesson that cheap goods are generally poor in quality, and that to shift the responsibility upon some one else is not to their credit, and that, furthermore, brains and ability must be coupled with conscience and industry in the making of every medicament prescribed by the physician or called for by the people.

USEFUL PRODUCTS OF THE CENTURY PLANTS.[1]

A LESSON ON MEXICO.[2]

By William B. Marshall,
Former Curator of the Philadelphia Commercial Museums.

In recent years Mexico has become a progressive country, and, although not ranked among the great powers, it has taken an honored place among the nations of the world. Its people come into contact with the rest of the world in nearly as many ways as do the people of the United States, but in lesser degree. The foreign commerce of Mexico, represented by the value of its imports and exports, already large, is increasing in importance each year.

The principal materials imported into Mexico are machinery, cotton textiles, iron and steel, wines and liquors, wool textiles, paper,

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[1] Reprinted from *Journal of Geography*, pp. 6–17, January, 1902.

[2] Continued from the December *Bulletin of the American Bureau of Geography*, Vol. II, No. 4, p. 328. The electrotypes used in connection with this article were furnished through the courtesy of the McCormick Harvesting Machine Company, Chicago.

textile fibres. Mexican capitalists and industrial leaders are making efforts to manufacture more and more of these materials in Mexico, in order to gain the profits from their manufacture, give employ-

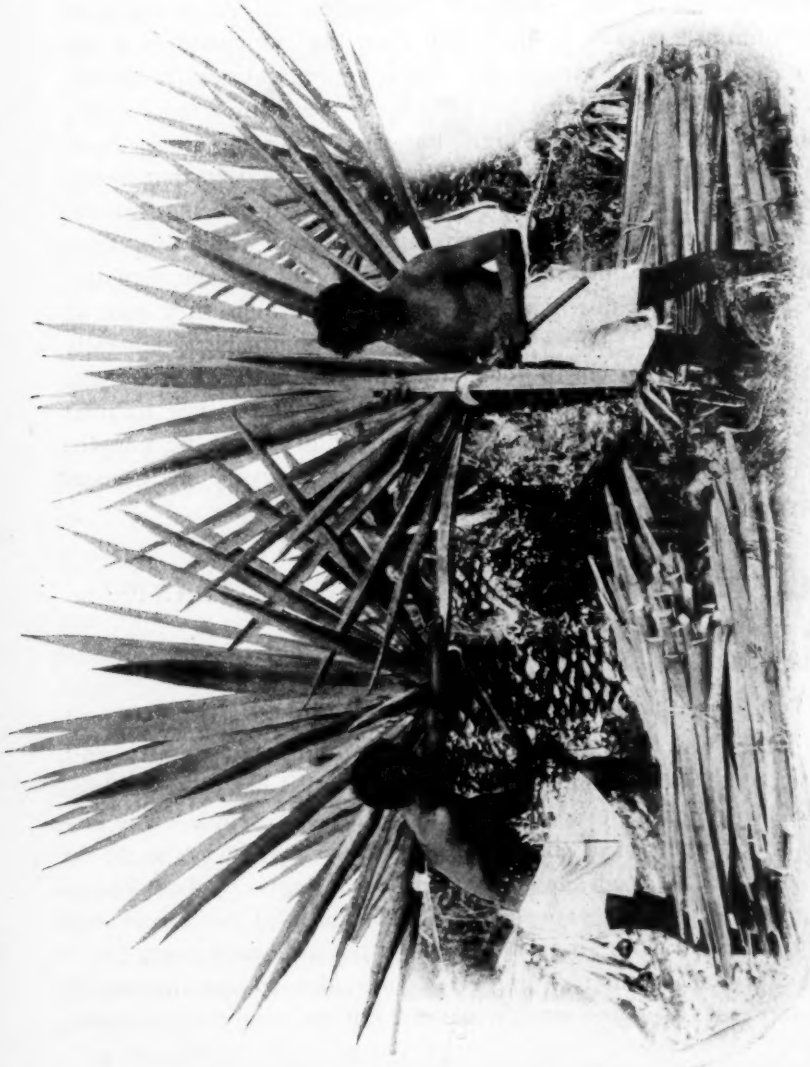

FIG. 1.—The leaves are cut with a curved knife. As each leaf is gathered it is trimmed along both edges to remove the prickles. (Page 326.)

ment to a greater number of their people, lessen the cost of the goods, and keep in Mexico the money that must be paid for them. The chief exports of Mexico are silver, henequen, gold, coffee, cattle,

copper, lead, hides, precious woods and zacaton root, the values of which are usually about as in the order given. In the production of silver, Mexico contests first place with the United States. She produces all the henequen of commerce.

Henequen (pronounced hen'e-ken) is a coarse vegetable fibre from 3 to 5 feet long. Its color is pale-yellow, nearly white. In Mexico the fibre is known by many names, the correct one and that most commonly used being henequen.[1] In the United States it is often called henequen, but more commonly sisal (pronounced sis'al) or sisal grass, or sisal hemp. The name sisal is given it because it was formerly exported from the port of Sisal on the northern coast of Yucatan.

The plant which yields sisal fibre is a species of agave (pronounced ah-ga'va) or century plant, known to the botanists as *Agave rigida sisalana.* When growing in our greenhouses we refer to it as *a* century plant, but not as *the* century plant. It is very similar to the common century plant and belongs to the same group or order of plants (*Amaryllidaceæ*), all of which, although there are about 125 species, resemble each other in a general way, just as all species of violets resemble each other. The full grown sisal plant has a thick stalk about 3 or 4 feet high, bearing at the top a number of long, broad, stout, fleshy leaves, with short, sharp spines along both edges, and a longer sharper spine at the tip. The flowers, of which there are several thousand, are borne on horizontal branches near the top of a pole-like flower-stalk from 20 to 30 feet high. The stalk and flowers resemble a tall candelabrum with numerous brackets, each bearing hundreds of lights. The fibre occurs as threads running the entire length of the leaf from the base to the apex. It is embedded in a great amount of white pulp.

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[1] There is much confusion regarding the names applied to this fibre. Henequen is used in a generic sense to include all the long agave fibres grown in Southern Mexico. In a restricted sense it is applied to a finer, whiter fibre than that usually designated as sisal. There is some doubt as to whether the sisal and henequen are yielded by different species of agave or by different agricultural varieties.

Maguey is a term used in a generic sense to designate various species of agave and the products obtained from them. In a restricted sense maguey is applied to the sap-yielding varieties. *Ixtle* is a term used to designate the short varieties of agave fibre and is applied also to the fibre of various other plants.

THE PRODUCTION OF THE FIBRE.

The sisal plant grows wild in many parts of Mexico and Central America, being hardy and able to thrive in many places where the soil is too poor to support other vegetation. Because of its commercial importance, regularity in the supply of the fibre is necessary to meet the demands of manufacturers; hence but little dependence is placed upon the wild plants as a source of supply. Nearly all the sisal used is grown on large plantations devoted to its cultivation.

The young plants may be grown from seeds, or from pole-plants, *i. e.*, young plants which form on the branches of the flower-stalk and drop to the earth and take root; but the method of propagation universally adopted is to transplant the suckers or shoots which spring up about the mother plant. The young plants are set out in rows from 6 to 10 feet apart. A less distance between the rows would render the plantation almost inaccessible because of the sharp spines with which the leaves are armed, and which often inflict serious wounds on the laborers. At the end of five years the first crop, consisting of eight or ten leaves from each plant, is harvested. For about twelve to fifteen years after this each plant yields about a dozen leaves per year, then dies and is replaced by a young plant. The labor is performed by Mexican Indians, usually under the direction of white overseers. The leaves are cut close to the stalk of the plant, with a curved knife fastened in the end of a handle about 12 inches long.

As each leaf is gathered it is trimmed along both edges to remove the prickles, and the stout spine at the tip is cut away. The leaves, called *pencas*, are then made up into bundles. On small plantations these bundles are removed from the field on the backs of men or burros. The large plantations are traversed by tramways on which flat cars drawn by burros are run to all parts of the fields to be loaded with bundles of leaves to be taken to the factory.

On a small scale the fibre is extracted by macerating the leaves in water to soften the pulp, which may then be easily scratched or combed away. In the factories the work is done on a large scale by various types of machinery, all of which first crush the pulp and then scratch or comb it away from the fibre. After the fibre is extracted it is dried in the open air. The drying-yards have in them a great number of posts planted in the ground, with pieces nailed near the top forming crosses on which the fibre is looped; or the posts are

FIG. 2.—The large plantations are traversed by tramways, on which flat cars drawn by burros are loaded with bundles of leaves to be taken to the factory.

connected by a number of rails over which the fibre is hung. When dry the fibre is baled in powerful presses in order to make it more convenient in handling, storing and shipping.

FIG. 3.—The drying yards have in them a great number of posts connected by numbers of poles over which the fibre is hung.

Yucatan is the great sisal-growing region—especially the portion of it surrounding the capital, Merida. In this district the sisal plant is almost the only vegetation. Several towns, notably Merida and

Progreso, the port from which sisal is exported, are wholly dependent upon this industry. Were it not for this industry the whole northwestern portion of Yucatan would be deserted.

"Thanks to its trade in henequen, or agave fibre, of which from 40,000 to 60,000 tons are annually exported, Merida has become the converging point of several lines, which, when completed, will cover the whole peninsula with a network of railways. For the present, however, the capital is connected only by a road with its ancient port, the little town of Sisal, at the northwest corner of Yucatan. From this seaport the henequen takes its English name of sisal hemp, by which it is known to the trade. The price of this valuable fibre has increased six-fold since the middle of the present century. The roadstead of Sisal, being exposed to the dangerous north winds, was abandoned in 1871, when a new *marina* was founded on the coast due north of Merida, with which it is connected by a railway 22 miles long. The line is carried over the coast lagoon by a strong embankment. The new town, which replaces the old Indian village of Tuxula, has already justified its name of *Progreso*, although the only advantage it enjoys over Sisal is its relative proximity to the capital. To shipping it is equally inaccessible, large vessels having to anchor in an open roadstead from 3 to 6 miles from port. So dangerous is the roadstead that steamers and sailing vessels are always ready to weigh anchor and escape to the high sea. Towards noon every day communication with the shore becomes almost impossible, owing to the violence of the surf under the action of the fierce northern gales." —"The Earth and Its Inhabitants," Elisée Reclus, 1891, D. Appleton & Co., N. Y.

EXPORT AND MANUFACTURE OF THE FIBRE.

The United States takes nearly all the sisal hemp exported. Several large manufacturing establishments in this country maintain agencies in Yucatan for the purpose of purchasing the fibre and keeping thoroughly informed as to the condition of the trade, the probable supply and possible variation in price.

Sisal hemp is one of the few important raw materials of the cordage industry in the United States, and almost the whole quantity imported is used for making ropes and binding twines. In Philadelphia and other cities there are extensive cordage works

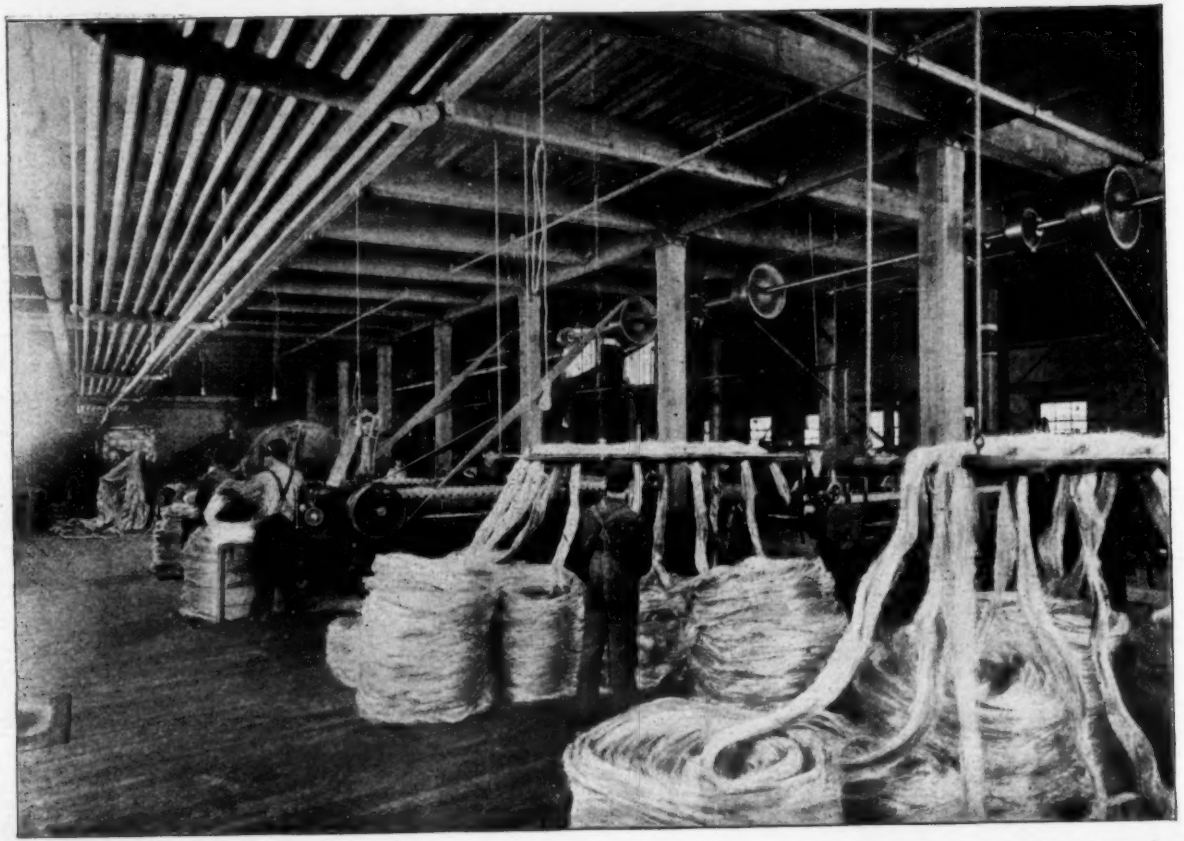

FIG. 4.—Preparation-room in the McCormick Mills at Chicago. First process in preparing the fibre for spinning.

which annually use large quantities of this fibre. Much of the binding twine used on harvesting machines, to bind the grain into sheaves as it is cut, is made of sisal. Some of the great establishments which make these harvesting machines, notably the great works located in Chicago, have their own twine mills employing hundreds of men and women, and their twines are sold in all parts of the world wherever modern agricultural machinery is in use.

Manila hemp of the Philippine Islands is almost its only competitor in the binding twine factories. In the cordage factories Manila hemp, sisal hemp, flax, common hemp, cotton and jute are the fibres commonly used. Sisal is preferred for certain uses, and because of its price and because of special demand in certain markets in which it is to be sold. For other uses it is not so good and is displaced by other fibres.

All the fibre produced is not exported from Mexico, but a very large part is retained for home-consumption, being made into a great variety of articles which are in everyday use in all parts of the country. Twines, ropes, matting, bagging, hammocks, sandals,[1] harness, baskets and ornaments are the principal articles made in Mexico from sisal. Rarely are any of these articles sent to the United States except as curios.

Tampico hemp, so named because it is exported from the port of Tampico in the State of Tamaulipas on the Gulf Coast, is a shorter stiffer fibre obtained from another species of century plant. San Luis Potosi is the centre of the district in which this fibre is grown.

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[1] "Shoes in Mexico are a foreign innovation, and properly form no part of the national costume. The great majority of the people do not wear shoes at all, and probably never will; but in their place use sandals, composed of a sole of leather rawhide, or plaited fibres of the maguey plant, fastened to the foot with strings of the same material, as the only protection for the foot needed in their warm, dry climate. And these sandals are so easily made and repaired that every Mexican peasant, no matter what may be his other occupation, is always his own shoemaker. As a general rule, also, the infantry regiments of Mexico wear sandals in preference to shoes; 'not solely for the sake of economy, but because they are considered healthier, keep the feet in better condition, and are more easily repaired or replaced, and make the marching easier.' Very curiously the pegged shoes of the United States and other countries are not made and cannot be sold in Mexico, as, owing to the extreme dryness of the atmosphere, the wood shrinks to such a degree that the pegs speedily become loose and fall out."—"A Study of Mexico," by David A. Wells. D. Appleton & Co., New York, 1887.

FIG. 4.—Preparation-room in the

The same name is given also to a fibre from a species of yucca. Tampico hemp is used for making brushes of various kinds, and for door-mats.

PULQUE, THE NATIONAL DRINK.

Several species are important because of their sap, which is used for making pulque, mezcal and some other liquors of less importance. These plants are known as the pulque agaves (pronounced pool'ka) and mezcal agaves. The common century plant of our greenhouses is one of the most important of the pulque agaves.

The pulque agaves are cultivated on the plateaus and in nearly all parts of the mountainous districts at from 6,000 to 8,000 feet above sea-level, but the vicinity of the City of Mexico is the great centre of the pulque industry. For a distance of about sixty miles on all sides of the capital city there are immense pulque plantations, many of them containing thousands of acres of land. Many small farms also are wholly or partially devoted to raising the pulque agave; and many families who do not make a business of growing the plant keep a few growing in their door-yards from which to obtain their own supply of pulque.

The pulque agaves are cultivated in the same manner as the sisal agaves. When ready to bloom the plant produces large quantities of sap which, under ordinary conditions, would go to form the tall stout flower-pole and flowers. But the "pulquero," *i.e.*, the sap-gatherer, cuts out the bud and the rosette of leaves in which it nestles and scoops out a hollow in the top of the plant. Into this hollow a great amount of sweet greenish, yellowish or whitish juice exudes. This juice is called *aguamiel*, meaning honey water, and is much liked. The flow continues for three or four months, some plants yielding as much as 2 gallons per day. The pulquero visits each plant at least twice a day to collect the sap. The sap is drawn by suction into a long gourd and is then emptied into a pigskin bag carried on the back of the pulquero or on the back of a burro. Each day the sides of the hollow in which the sap is collected are scraped in order to permit free exudation. But small quantities of *aguamiel* are consumed, because it so rapidly ferments that transportation to the cities is almost impossible. When fermented it is called pulque. The usual method of fermenting is to add an equal amount of milk and a small quantity of rennet; pour the mixture into vats made of

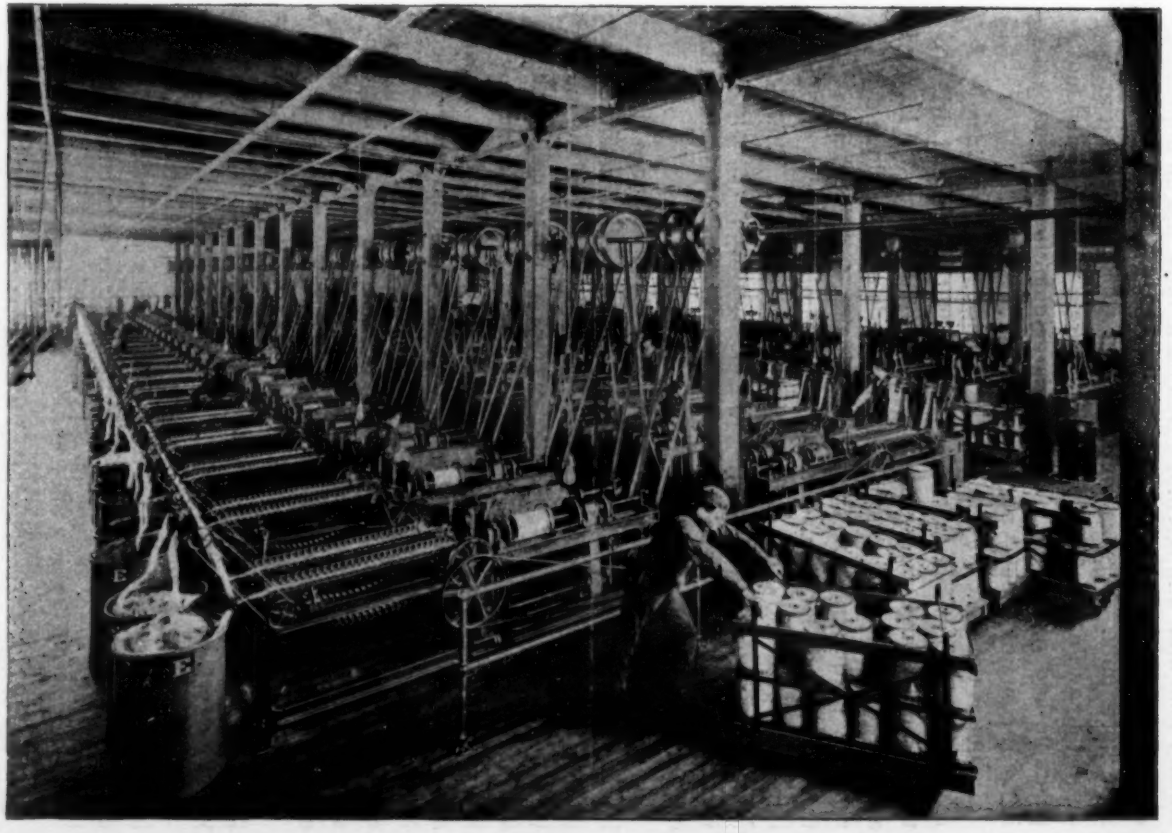

FIG. 5.—One of the five spinning-rooms in the great McCormick Twine Mills.

raw cowskins and allow it to stand about thirty-six hours. It curdles somewhat and resembles thin buttermilk, has an unpleasant odor like partially decayed meat or rancid cheese and tastes like stale buttermilk. Persons unaccustomed to its use find it at first disgusting and nauseating, but soon acquire a taste for it and find it palatable and refreshing. Taken in large quantities it is intoxicating. It contains about 7 per cent. alcohol.

Pulque is the national drink of the Mexicans, just as beer is the national drink of the Germans, or as wine is the national drink of the French. Large areas of land and many thousands of laborers are devoted to its production. The railroads of the pulque district run daily pulque trains to the City of Mexico, and to other parts of the country, and large quantities are carried on the backs of burros into the capital and other cities in the pulque district. The City of Mexico has about 1,000 "pulqueras" or "cantinas," *i.e.*, saloons, in which nothing but pulque is sold. The daily consumption in that city exceeds 50,000 pints.

Another product of agave is mezcal, a clear, strongly alcoholic liquor made by distilling the sap of various species of agave. The pulque agaves may be used for the purpose, but most of the mezcal is distilled from the juice of other species which are called mezcal agaves or mezcal magueys. These plants have thinner and narrower leaves than the pulque agaves. Mezcal is called also *mexcal*, *aguardiente de maguey*, and *tequila*. In English it is often called Mexican brandy. Its taste resembles that of strong rum. It is extremely intoxicating and brutalizing. Large quantities are consumed throughout Mexico, and it is one of the national drinks. The entire product of pulque and mezcal is consumed in Mexico.

Vinegar is made by rapidly fermenting the sap. When completely evaporated the sap yields sugar; partially evaporated it yields a sweet, honey-like syrup.

The pulque and mezcal agaves yield fibre similar but much inferior to that of the sisal agaves. The plants are grown almost exclusively for the sap products. What fibre is extracted is used locally.

A WIDE VARIETY OF PRODUCTS.

The fibre and the sap are the most important products of these plants, and it is for these that they are cultivated. But there are many

other uses for which the plant itself and its products, and the by-products and wastes of the fibre-extracting mills are adapted. The waste fibre of the mills is used for oakum and as packing material, and can be used for making coarse paper. A handful of the waste serves as a toilet sponge and is quite commonly used in this way. The sharp spine at the tip of the leaf is often used as a nail. With a strand of fibre left attached to it, it serves as a threaded needle and is much used for sewing up bagging, repairing harness, sandals, etc. The flower-stalks are used for fishing poles, lance-handles, razor strops, and for constructing the walls of huts. The leaves are used as fodder and to thatch huts. The roots and leaves of several species, especially *Agave saponaria*, are used as soap substitutes.

The plants are much used in Mexico for hedges, and in many parts of the world in ornamental gardening.

STATISTICS OF OUR IMPORTS.

During the year ending June 30, 1900, the principal fibres imported into the United States were valued at $26,373,805, which was distributed among the various fibres, as shown in the following table:

U. S IMPORTATIONS OF FIBRE FOR THE YEAR ENDING JUNE 30, 1900.

	Tons.	Dollars.
Sisal	76,921	11,782,263
Manila	42,624	7,172,368
Jute and jute butts	102,694	3,956,413
Flax	6,967	1,646,274
Istle or Tampico	5,748	475,090
Hemp	3,400	450,269
All other	10,953	891,128
	249,307	26,373,805

THE PRESCOTT PORTRAIT.—A life-size oil portrait of Dr. Albert B. Prescott was presented to the University of Michigan by the alumni of the School of Pharmacy on June 18th. Dr. A. B. Lyons was chairman of the meeting, and Mr. A. L. Parker formally presented the portrait to the University. President James B. Angell, responding on behalf of the University, alluded to Dr. Prescott's long connection with it, and said that the University Faculties looked forward to the day when a great chemical laboratory should replace the present one—one worthy of the University and worthy to bear the name of the Prescott Laboratory. Dr. Edward Kremers, of Madison, Wis., delivered an address on "The State University and Pharmaceutical Education." An informal reception at the residence of Prof. A. B. Stevens concluded the exercises.

LEGISLATION AND JUDICIAL DECISIONS OF INTEREST TO PHARMACISTS FOR THE YEAR 1901–1902.

By J. H. Beal.

LEGISLATION.

The winter has been noteworthy for the fact that fewer measures than common have been introduced either by pharmacists or aimed at them by antagonistic interests. In several States bills have been introduced proposing to register physicians as pharmacists without examination, and also to admit to the register persons who have had a certain number of years' experience. So far as we have been able to learn, all such measures have been defeated.

In at least three States, and possibly in others, attempts were made to pass laws prohibiting the charging of soda fountains in buildings used for any other purpose. These measures were pushed by the bottling interests, and would have absolutely prevented the charging by druggists of their own fountains. Fortunately for the drug trade, the bills were all defeated, and a similar law passed in New York two years ago was repealed.

Like measures will doubtless appear in the future, and it behooves pharmacists to be on the alert while the general assemblies are in session.

Ohio now has a brand-new poison law, based principally upon the poison section of the A.Ph.A. model, a copy of which is printed below, and although it does not go into effect until January, 1903, its effect is seen in the fact that a number of country grocers have already thrown out their stock of drugs, with the statement that if they must register the sale of every poison they won't handle such articles at all. Thus the public will receive a better measure of protection, while the pharmacist will come into his own again.

OHIO POISON LAW.

Replacing the former Poison Law, the Poison-Label Law and the Morphine Law.

Section 1. It shall be unlawful for any person to knowingly sell or deliver to any minor under sixteen years of age, except upon the written order of an adult, or to sell or deliver to any person, any of the following described substances, or any poisonous compound, poisonous combination or poisonous preparation thereof, to wit: The compounds and salts of antimony, arsenic, chromium,

copper, lead, mercury, zinc, the concentrated mineral acids, oxalic and hydrocyanic acids and their salts, yellow phosphorus, carbolic acid, the essential oils of almonds, pennyroyal, tansy and savin, croton oil, creosote, chloroform, chloral hydrate, cantharides, or any aconite, belladonna, bitter almonds, colchicum, cotton root, cocculus indicus, conium, cannabis indica, digitalis, hyoscyamus, ignatia, lobelia, nux vomica, opium, physostigma, phytolacca, strophanthus, stramonium, veratrum viride, or any of the poisonous alkaloids or alkaloidal salts or other poisonous principles derived from the foregoing, or any other poisonous alkaloids or their salts or any other virulent poison, except in the manner following:

It shall first be learned by due inquiry that the person to whom delivery is made is aware of the poisonous character of the substance, and that it is desired for a lawful purpose, and the box, bottle or other package shall be plainly labeled with the name of the substance, the word "poison," and the names of two or more substances which may be used as antidotes. And before delivery shall be made of any of the foregoing substances, there shall be recorded in a book kept for that purpose the name of the article, the quantity delivered, the purpose for which it is alleged to be used, the date of delivery, the name and address of the purchaser, and the name of the dispenser, which book shall be preserved for at least five years, and shall at all times be open to inspection by the proper officers of the law.

SEC. 2. The provisions of Section 1 of this act shall not apply to articles dispensed to or upon the order or prescription of persons believed by the dispenser to be lawfully authorized practitioners of medicine or dentistry, and the record of sale and delivery above mentioned shall not be required of manufacturers and wholesalers who shall sell any of the foregoing substances at wholesale, but the box, bottle or other package containing such substance, when sold at wholesale, shall be properly labeled with the name of the substance, the word "poison," and the name and address of the manufacturer or wholesaler; nor shall it be necessary to place a poison label upon, nor to record the delivery of sulfid of antimony, or the oxid or carbonate of zinc, or of colors ground in oil and intended for use as paints, or calomel, paregoric, or other preparations of opium containing less than 2 grains of opium to the fluid ounce, nor in the case of preparations containing any of the substances

named in Section 1 of this act when a single box, bottle or other package, or when the bulk of ½ fluid ounce or the weight of ½ avoirdupois ounce does not contain more than an adult medicinal dose of such poisonous substance; nor in case of preparations recommended in good faith for diarrhœa and cholera, when each bottle or package is accompanied by specific directions for use and a caution against habitual use; nor in the case of liniments and ointments when plainly labeled "for external use only;" nor in the case of preparations put up and sold in the form of pills, tablets or lozenges and intended for internal use, where the dose recommended does not contain more than one-fourth of an adult medicinal dose of such poisonous substance.

SEC. 3. It shall be unlawful for any person to dispense, sell or deliver to any person, any salts of cocaine, morphine or its salts, or any of the alkaloids or salts of alkaloids of opium, except upon the written prescription of a legally qualified physician or dentist, such prescription not to be refilled, except upon the written order of the person prescribing the same; except, however, that sulphate of morphine may be sold by a registered pharmacist or assistant pharmacist in original packages containing not less than ⅛ ounce when registered in accordance with the provisions of Section 1 of this act.

SEC. 4. The penalty for the violation of any of the provisions of any section of this act shall not be less than ten dollars nor more than fifty dollars for each separate offense.

SEC. 5. Section 4238–27, Section 4364–54 and Section 6957 of the Revised Statutes of the State of Ohio are hereby repealed.

SEC. 6. This act shall take effect and be in force from and after the first day of January, A.D. 1903.

The legislature of Ohio also enacted a law prohibiting the promiscuous distribution of samples of pills and other potent medicines, and an anti-cocaine law, prohibiting the sale of cocaine, except upon physician's prescription.

Perhaps the measure which gave the most joy to Ohio druggists, however, was the law repealing the infamous Middleton Act. This was an act which slipped through the general assembly two years ago without its true intent being known. It gave any one the right to bring an action against any druggist for violating the Dow Liquor Tax Law. Under it a spy would obtain liquor from a drug-

gist by false pretense, and then threaten prosecution unless paid a certain amount of hush-money. Most druggists would settle rather than submit to the scandal and expense of a prosecution, and as a consequence the professional spies and informers waxed opulent during the two years of its existence.

In New York the pharmacy law has been again amended, so as to increase the number of societies which may take part in the election of members of the Board of Pharmacy.

Maryland, after a contest extending over fifteen years, has at last enacted an all-State law, which is printed below. While it may be considered as a long step in the right direction, the exceptions in Sections 14a, 15½ and 16 largely nullify the good effect which it would otherwise have.

MARYLAND PHARMACY LAW.

SECTION 2. *And be it further enacted,* That no person on or after the first day of July, following the passage of this act, shall open, conduct or keep a pharmacy in this State, either as a principal or agent, unless such person shall have obtained a pharmacist's certificate, as hereinafter provided, and no pharmacy shall at any time be left in charge of any person who is not a certified pharmacist, a certified acting pharmacist or a certified assistant pharmacist, to compound prescriptions or sell or dispense poisonous drugs. It shall, however, be lawful for physicians and dentists to compound and dispense their own prescriptions; but unlawful for any person, dealer or firm, not a certified pharmacist, a certified acting pharmacist or certified assistant pharmacist, to compound a physician's prescription. Any person violating this section shall, upon conviction, be deemed guilty of a misdemeanor, and fined not more than one hundred dollars for each offense.

SEC. 3. *And be it further enacted,* That every store or shop where drugs, medicines or chemicals are sold at retail, displayed for sale at retail, where physicians' prescriptions are compounded, which has upon it or in it as a sign the words "pharmacist," "pharmacy," "apothecary," "drug store," "druggist," or any of these words or exhibits, the characteristic show bottles or globes filled with colored liquids, shall be considered a pharmacy within the meaning of this act.

SEC. 4. *And be it further enacted,* That on or before the first day of May, following the passage of this act, the Governor shall

appoint five persons who are skilled and competent pharmacists, who have had ten years' active pharmaceutical experience, are actively engaged in the retail drug business and not connected with any school of pharmacy or medicine either as teachers, instructors or members of the board of trustees, to be Commissioners of Pharmacy, two of whom shall be residents of the city of Baltimore, and three residents of the counties of the State. Said commissioners shall constitute the Maryland Board of Pharmacy, and shall hold office as follows: One to serve five years, one four years, one three years, one two years, and one one year from the first of May next; in the first instance the Governor to designate in the appointment who to serve one, two, three, four and five years, and thereafter annually the Governor shall appoint one person to serve as a member of said board for the term of five years. The said commissioners shall, within ten days after notification of their appointment, each subscribe to an oath before the clerk of the Superior Court of Baltimore City, or the clerk of the Circuit Court of any county, to impartially and faithfully discharge the duties prescribed by this act. The position of any commissioner appointed under this act, who shall fail to qualify within the time and in the manner hereinbefore named shall be deemed vacant. The Governor shall fill all occurring vacancies from such sections of the State as will cause the board to be constituted as hereinbefore provided.

SEC. 5. *And be it further enacted*, That the said board shall organize by the election of a president, secretary and treasurer, who shall serve for the term of one year, and who shall perform the duties prescribed by the board. Meetings for the examination of applicants for registration shall be held on the first Thursday in April and October in each year, in the city of Baltimore, or at such times and places as may be fixed upon by the board; provided that ten days' public notice of the hour and place of each meeting at which there is an examination of candidates for registration shall be given. It shall be the duty of the board to receive all applications for examination and registration submitted in proper form; to grant certificates to such persons as may be entitled to the same under this act; to report annually to the Governor upon the condition of pharmacy of the State, which report shall also furnish a record of the proceedings of the board, as well as the names of all persons registered under this act; to keep a book in which shall be reg-

istered the names and places of business of all persons registered under this act, and all facts pertaining to the granting of certificates. The said board shall have the power to adopt any rules and by-laws not inconsistent with this act, necessary to the transaction of the business of this board; to demand and receive from applicants the fees herein provided, which shall by the treasurer of the board be paid to the treasurer of the State.

SEC. 6. *And be it further enacted,* That the salaries of said board shall be fifty dollars per annum to each member, and all legitimate expenses incurred in the discharge of official duties. The secretary of said board shall receive an additional salary to be fixed by the board, and not to exceed two hundred dollars per annum; he shall pay to the treasurer at each meeting, or whenever the board may direct, such funds of the board as may be in his possession, and take the treasurer's receipt therefor. In its annual report to the Governor, the board shall render an account of all moneys received and expenses incurred pursuant to this act, and the secretary and treasurer shall give such bond as the board shall from time to time direct.

SEC. 7. *And be it further enacted,* That any person who is at the passage of this act registered or entitled to registration in Baltimore City as managing owner, managing assistant or relief clerk, and shall, on or before the first day of July next following the passage of this act, pay to the Maryland Board of Pharmacy a fee of one dollar, shall be entitled to registration as pharmacist and receive a certificate of such registration.

SEC. 8. *And be it further enacted,* That any person who, at the passage of this act, is actively engaged as owner or manager, or is and has been so engaged as clerk for five years or more, and has reached the age of twenty-one years, in compounding drugs and dispensing physicians' prescriptions in one of the counties of this State, and who shall, on or before the first day of July next following the passage of this act, forward to the Maryland Board of Pharmacy an affidavit to that effect, together with a fee of one dollar, shall be entitled to registration as pharmacist and to a certificate of such registration.

SEC. 9. *And be it further enacted,* That on and after the passage of this act, any person who has had four years' continuous active experience in a pharmacy where physicians' prescriptions are daily

compounded, and has reached the age of twenty-one years, who, after examination by the Maryland Board of Pharmacy, shall be by it deemed competent, shall be registered as pharmacist and be given a certificate of such registration. Such person shall make application to the secretary ten days before any of the meetings of the board, and shall pay to the board a fee of five dollars.

SEC. 10. *And be it further enacted,* That any person over the age of eighteen who, at the passage of this act, is employed as a clerk or assistant in a pharmacy in this State, and has been actively engaged for one year in a pharmacy where physicians' prescriptions are daily compounded, and shall, on or before the first day of July next following the passage of this act, forward to the Maryland Board of Pharmacy an affidavit to that effect, together with a fee of fifty cents, shall be entitled to registration as assistant pharmacist and a certificate of such registration.

SEC. 11. *And be it further enacted,* That any person who has had two years of continuous active experience in a pharmacy where physicians' prescriptions are daily compounded, and has attained the age of eighteen years, who, after examination by the Maryland Board of Pharmacy, shall by it be deemed competent, shall be registered as assistant pharmacist and be given a certificate of such registration. Such persons shall make application to the secretary of the board ten days before any of its stated meetings, and pay to the board a fee of three dollars.

SEC. 12. *And be it further enacted,* That every applicant for examination shall, with his application to the secretary of the board, file a written declaration, duly sworn to before a justice of the peace or notary public, stating the pharmacy or pharmacies in which he has had the experience demanded in Sections 9 and 11. Any one swearing falsely in the affidavit so filed shall be deemed guilty of perjury.

SEC. 13. Every person receiving a pharmacist's or assistant pharmacist's certificate shall keep the same conspicuously posted in his place of business.

SEC. 14. *And be it further enacted,* That any certificate obtained by false representation shall be void, and the offender shall be fined not more than fifty dollars, or imprisonment for thirty days, or both, in the discretion of the court.

SEC. 14A. *And be it further enacted,* That nothing in this act shall

prevent regularly licensed physicians of the State of Maryland from selling and compounding drugs and medicines as a pharmacist.

SEC. 15. *And be it further enacted*, That all acts or parts of acts pertaining to the practice of pharmacy in the State of Maryland, in so far as they conflict with this act, are hereby void.

SEC. 15½. *And be it enacted*, That the provisions of this act shall not apply to Talbot County.

SEC. 16. Provided, however, that nothing in this act shall be construed as preventing general merchants of the counties of the State or of Baltimore City from selling such drugs and medicines as have heretofore been handled by the general merchants of the State of Maryland, or any registered physician of this State from personally compounding and dispensing drugs and medicines.

The enactment of the Maryland law now leaves Idaho the only State in the Union without a pharmacy law.

Massachusetts druggists are rejoicing in the fact that the "Blue Laws" prohibiting the sale on Sunday of candy, cigars and soda-water were repealed at the last session of the State law-making body. Their repeal illustrates anew the fact that the druggists of a State are powerful enough to compel or prevent almost any kind of legislation when they work earnestly and harmoniously.

The preceding acts are the more important of the year's grist of legislation affecting pharmacy. Some minor changes and attempted changes have been reported from other States, but the writer has not yet been able to procure definite information concerning them.

JUDICIAL DECISIONS.

An interesting decision has been had in Iowa upon the responsibility of a vendor for injury caused by dangerous articles sold without giving notice of their dangerous qualities.

In this case (the Torbet case) the plaintiff called for phosphorus, which he received, properly labeled, but being injured because of his ignorance of the properties of the stuff, brought suit on the ground that the druggist was negligent in not giving notice of the dangerous qualities of the article supplied. The court says: "When a person who has reached the age of discretion, and who is apparently in the possession of his mental faculties, applies to a druggist for a certain drug, he represents to the dealer by implication at least that he knows its properties and uses and that he is a fit person to

whom sale thereof may be made, and that unless there is something connected with the transaction or something previously known to the seller, indicating that the would-be purchaser cannot safely be entrusted with the substance, a sale of the substance called for may be made without explaining its properties or the manner in which it may be safely used or handled."

This decision apparently overthrows the doctrine laid down in the case of Wellington *vs.* Downer (104 Mass., 67), where the court says: "It is well settled that a man who delivers an article which he knows to be dangerous or noxious, without notice of its dangerous qualities, is liable for any injury which may reasonably be contemplated as likely to result therefrom to that person or any other who is not himself in fault."

This was a case where naphtha was sold to a person ignorant of its nature, and who was injured by an explosion. The injured person was held entitled to recover damages.

A decision by the Kentucky Court of Appeals is of interest in that it decides that the prerogatives of a physician give him no right to sell drugs indiscriminately. The court says that a physician "cannot sell indiscriminately to persons calling for prescriptions, nor compound drugs and sell them indiscriminately to all who may call for them."

This seems just doctrine, and it is to be hoped that it will be followed by other courts which may have to pronounce upon such cases.

Much has been said of several decisions in cases brought by the Phenyo-Caffeine Company to prevent the sale of their goods at cut prices, and of the effect which these decisions will have upon the so-called Worcester Plan, made famous by the decision in the case of Garst *vs.* Harris, decided in Massachusetts about a year ago. So far as we can determine from the published accounts, these cases do not in the least infringe upon the integrity of the doctrine laid down in Garst *vs.* Harris. The latter case established the doctrine that a vendor may lawfully contract with his vendee that the latter shall not sell the articles bought under the contract below a certain price. This was a marked departure from the old common-law rule that all contracts restricting prices were against public policy and void, and the decision was justly hailed as a great step in the direction of price-protection. The later decisions referred

to do not contravene this doctrine in the least, but hold—and no doubt justly—that a mere purchase of goods marked to be sold at a certain price only is not sufficient evidence of the assent of the vendee to the terms printed on the wrapper.

In other words, the late cases merely affirm the good old rule that a man cannot be held for a breach of contract unless it can first be proved that he expressly or impliedly assented to the terms of the contract.

The N.A.R.D. plan has received a setback in the decision of the Georgia Supreme Court in the Jacobs conspiracy case. This was a suit brought by Joseph Jacobs, of Atlanta, against the local association for conspiracy to prevent him from obtaining goods from jobbers. The court in its decision affirms the old common-law doctrine that any combination to maintain prices is illegal, and that contracts designed to make such combinations effective are void, as against public policy.

The general tendency of courts, however, as shown by the case of Garst *vs.* Harris mentioned above and other cases, is to relax the strictness of the common-law doctrine of contracts in restraint of trade, and it is hardly probable that the Georgia decision will be universally followed.

In addition to the cases above mentioned, several others of interest are pending in several States and will receive mention when decided.

THE STERILIZATION OF SOLUTION OF MAGNESIUM CITRATE.[1]

By Herbert J. Watson.

This solution should have first place among those which are entitled to rank among the preparations of elegant pharmacy. With the proper manipulations, in which a complete destruction of the deleterious microscopic organisms is affected, this solution may have this position.

Some contend that the use of heat injures the flavor, but this contention is not founded on any statements that have been published, so far as the author is aware.

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[1] Read at the Delaware Pharmaceutical Society, June 5, 1902, and communicated by the author.

The solution of magnesium citrate is a favorable medium for the development of these micro-organisms, and while its preparation has caused a very wide diversity of opinion among pharmaceutical writers, still some appear to have pursued rational methods of preparation. Some suggest the boiling of the water before adding to the syrup and magnesia solution, stating that it will thus keep indefinitely. Fifteen minutes' boiling for three successive days would be required for this method, the entire solution being used. Others suggest placing the filled bottles into a pan of boiling water for half an hour. This method would be effective if the bottles were placed in an Arnold sterilizer for three consecutive days, fifteen minutes each. Samples sterilized by this method in our laboratory, with an Arnold form, kept for three months without the formation of the slightest sediment. Another method, without the aid of sterilization, is to place the syrup in the bottles, then the solution of magnesium carbonate, water next, the crystals of potassium bicarbonate being the last addition. Stopper and set aside without the slightest agitation. The sediment in this solution appeared a few days later than in the pharmacopœial solution.

Experiments showed that the micro-organisms appear in three to five days in the official preparation. Samples made from tap and distilled water, with varying amounts of syrup of citric acid, required the same number of days' incubation at room temperature.

As a result of his experiments the writer proposes a method as follows: "Place the filtered magnesium citrate solution in bottles with the syrup of citric acid and distilled water, then small plugs of cotton between the rubber stopper and neck of the bottle and sterilize for three days, fifteen minutes each day. The autoclav, or the pressure sterilizer, requires but twenty-five minutes 110° C. under 6 pounds pressure.

Take small vials, 2 drachms each, add 35 grains potassium bicarbonate, plug with cotton, and place in a dry oven or sterilizer for one hour at 150° C. or 302° F. When the bottles containing the solution and salt are cool enough, carefully remove cotton from each, adding the contents of the vial to the syrupy solution, stopper tightly and dispense as needed. The solution thus prepared is a stable and pleasant cathartic, a sweet, aromatic, effervescing and carbonated beverage, and yields a profit of 65 per cent.

The organisms predominating in the different specimens ex-

amined were represented in the molds, yeasts, and bacteria. Penicillium glaucum was the mold found, Saccharomyces ellipsoideus the yeast, and the bacteria were indefinite.

BLOOD EXAMINATION AS AN AID TO THE GENERAL PRACTITIONER.[1]

By Warren S. Simmons, M.D.

Read before the Medical Society of the County of Kings, November 19, 1901.

In calling attention to the value of the examination of the blood in our everyday work, it is impossible to give an exhaustive account of the many departures from normal that are found in this fluid.

At the present time the various medical journals contain many articles on this important subject, although the majority of them are practically confined to discussing its relation to surgical disease, and completely ignore the fact that there are other conditions where the blood examination furnishes us with a very exact knowledge of the patient's condition, or at least gives us certain clues that are of inestimable value in establishing a diagnosis and applying proper treatment.

As regards the value of a blood examination, the profession at large appears to be divided into four important groups.

First, there are those who have made their diagnoses and instituted successful treatment before this subject was given the attention and prominence which it now occupies, and, considering their past successes, believe that it is of no value, or at least an added trouble, and deem themselves capable of treating their cases as well at the present time without its aid as they have done in the past.

A second class have confined their diagnoses almost entirely to the knowledge which is furnished by the condition of the blood, and in their enthusiasm for this one condition have completely lost sight of other symptoms which would act as a check upon mistaken premises.

There is still another group, men who, by the records and papers of the enthusiasts, have been led to believe that the knowledge thus

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[1] Reprinted from the *Brooklyn Medical Journal*, 1902, p. 17.

gained is of more importance and value than is seemingly the case. Having laid too much stress upon this point, they have been mistaken in their deductions and have often found conditions opposite to those one would naturally expect, and in their disappointment have rejected it.

The fourth and last class are those who I think rightly estimate this clinical phenomenon, and attribute to it in the majority of instances its true value as being one symptom that goes to make up the completed whole, weighing it carefully as regards the other findings in each individual case and giving to it only the consideration which is given to any other one fact.

Normal human blood consists of plasma, red and white cells, blood plates and blood dust.

The red cells or erythrocytes are bi-concave discs and contain no nucleus. They are derived in extra-uterine life practically almost entirely from the red bone-marrow. In the early and late stages of the fetus, however, they are found developing respectively in the newly forming capillaries, the liver and spleen. The number of erythrocytes averages about 5,000,000 per c.mm. in men and a slightly less number are found in the blood of women. Their principal constituent is hemoglobin. In diseased conditions the erythrocytes may be altered in shape, size, number, percentage of hemoglobin and the appearance in the blood of nucleated corpuscles (normoblasts and megaloblasts), or the cells themselves may contain micro-organisms.

The white cells or leucocytes are colorless, nucleated bodies. They are derived from the lymph nodes, spleen and marrow. Their number is variously estimated from 5,000 to 10,000 per c.mm., the average of 16 independent observers being about 7,900. These cells are divided into groups and named in accordance with their size, shape of nucleus and reactions to acid, basic and neutral stains. The principal varieties are lymphocytes, large mononuclear leucocytes, polynuclear leucocytes and eosinophile leucocytes; and are also classed as basophile cells, neutrophile cells and eosinophile cells.

The basophile cells are the lymphocytes and the large mononuclear leucocytes. The neutrophile cells are the polynuclear leucocytes. The eosinophile cells are the so-called eosinophile leucocytes.

By a combination of these terms we arrive at those which are commonly used in expressing pathological findings. In diseased conditions, besides their increase in number, either relative or absolute, myelocytes also appear.

The proportion of the various leucocytes, according to Ehrlich's figures, are: Lymphocytes, 22, 25 per cent.; large mononuclear and transitional leucocytes, 2, 4 per cent.; polynuclear neutrophile leucocytes, 70, 75 per cent., and eosinophile leucocytes, 2, 4 per cent.

The blood plates are considered to be the extruded nuclei of the red blood cells, and for our purpose have no pathological significance; neither has the blood dust.

The technique of a blood examination is distinctly in the realm of the specialist in pathology, and to him should be intrusted the responsibility of this important procedure. I wish to emphasize markedly that he alone is the person to perform this work, for I truly believe that the blood examination as conducted by the average practitioner will be of no value whatever. Certainly there are not more than 25 physicians in Brooklyn who can perform this task satisfactorily and upon whose pathological report any reliance can be placed.

Such an examination should be conducted by men who possess the necessary knowledge, exact methods, special laboratory facilities, and above all, a skill in their work that only comes from an extensive experience, for certainly no good would accrue to our patients if we were to mistake small particles of dirt for malarial organisms, and in choosing a wrong time for a blood examination, report to the surgeon a marked leucocytosis, which is only the normal result of digestion.

I would add, too, that it is much better for the pathologist to secure the specimen himself, and also that he be instructed upon just what particular points information is desired; whether the number of cells—red or white—the percentage of hemoglobin, the presence or absence of micro-organisms or certain serum reactions which are now obtained.

The principal diseases in which we are aided in diagnosis by the changes in the red cells are the primary and secondary anemias.

In simple anemia or chlorosis the red cells are slightly decreased or increased in number and the hemoglobin is markedly decreased.

The color index is usually low. This color index is really an estimation of the amount of hemoglobin in each cell on a percentage basis, and is obtained by dividing the percentage of hemoglobin by the percentage of the red cells present, 5,000,000 of the erythrocytes being considered 100 per cent.

Therefore, given a case with 3,000,000 red cells and 50 per cent. of hemoglobin, the color index would be ·83 (found by dividing 50 per cent. hemoglobin by 60 per cent. red cells present), the normal color index being represented by 1.

In pernicious anemia, the number of red cells is markedly reduced, even to 1,000,000 or less. They are altered in size, shape and appearance of nucleated forms, namely, megaloblasts, large nucleated red cells and normoblasts, or nucleated red cells of nearly normal size.

In the secondary anemias, namely, those following hemorrhages, acute or chronic infectious febrile diseases, malignant growths, some intestinal parasites, etc., the conditions of the red cells are identical with those found in simple and pernicious anemias, varying in degree according to the severity of these secondary causes.

An increase in the number of the white cells or leucocytosis is ***normally*** present in the newly born, during digestion, the latter part of pregnancy, after parturition, after violent exercise, massage, cold bathing and in the moribund state.

Pathological leucocytoses are post-hemorrhagic, inflammatory toxic, those found in malignant disease, and those due to therapeutic and experimental influence. According to Cabot we have the following subdivision:

Inflammatory.—(*a*) Infectious diseases with comparatively slight local inflammatory processes: Asiatic cholera, relapsing fever, yellow fever, typhus fever, scarlet fever, bubonic plague, erysipelas, secondary stage of syphilis, diphtheria and true follicular tonsillitis.

(*b*) Infectious diseases with more extensive local lesions: Pneumonia, smallpox, malignant endocarditis, trichinosis, glanders, actinomycosis, septicemia and all conditions that are the result of suppurative inflammation.

The febrile state of acute multiple neuritis: Acute articular rheumatism, cerebro-spinal meningitis, cholangitis, cholo-cystitis, empyema of gall-bladder, acute pancreatitis, endometritis, some cases of

cystitis and gonorrhea, serous and purulent non-tubercular inflammations, such as pericarditis, peritonitis, conjunctivitis, etc., gangrenous inflammations of the appendix, lungs, bowels, mouth, etc., and many inflammatory skin diseases.

The principal toxic leucocytoses are those found in illuminating gas poisoning, quinine poisoning, uric acid diathesis, rachitis, acute yellow atrophy of the liver, and those cases of hepatic cirrhosis associated with jaundice, acute gastrointestinal disorders, the uremic state of cases of chronic nephritis, after the injection of tuberculin and thyroid extract, after intravenous injection of normal saline solution, after ingestion of the salicylates.

In certain diseases leucocytosis is absent, namely, typhoid fever, malaria, most cases of grippe, measles, mumps, some cases of cystitis, tuberculosis, including miliary tuberculosis and incipient phthisis and tubercular inflammations of the peritoneum, pericardium, the bones, periosteum and pleura.

A lymphocytosis is an increase in the number of lymphocytes in the blood; the remaining forms of the leucocytes may or may not be increased in this condition. Its principal diagnostic value lies in the fact that it is an aid to us in obscure syphilitic disease, and also it is a most important symptom in the lymphatic leukemia.

Micro-organisms are found in the blood in malaria, as the Plasmodium malariæ; relapsing fever, its spirillum; elephantiasis, the Filiaria sanguinis hominis; and septicemia, the pyogenic micrococci.

The so-called serum reactions are the phenomena observed when certain bacteria are brought in contact with the diluted serum of a patient suffering from the disease which they invariably cause. This reaction consists of a loss of their motility and the fact that they become clumped together in groups.

The most important diseases in which these reactions occur are: Typhoid fever (usually after the tenth day), accomplished by a dilution of serum in the strength of 1 in 30 or less.

Bubonic plague (in the second week) with a dilution of 1 in 10, and an increasing dilution as the disease goes on.

Relapsing fever and leprosy.

RECENT LITERATURE RELATING TO PHARMACY.

THE NATURE OF THE ENZYMES.

There appeared in the *Pharmaceutische Centralhalle*, for October, 1901, an article upon the nature of the enzymes, in which the author, Th. Bokorny, gives quite a comprehensive treatise, in a tabular form, of the most important of the enzymes, together with a short theoretical consideration as to their source and probable admixtures as contained in the protoplasm, together with methods for their extraction and effect upon their fermentative activity as produced by physical and chemical means.

The separation of the enzymes from their admixtures is very difficult, and in fact can rarely be accomplished without damage to or destruction of their fermentative power. As the protoplasms consist of nucleoalbumins, the enzymes obtained from them are likewise nucleoalbumins, because the splitting of albuminous material, carbohydrates, etc., is carried out by the protoplasmic material given off by the living protoplasm, and consequently, for fermentation, the direct contact of the living protoplasm is not necessary.

Halliburton and Pekelharing have confirmed the theory as regards the nucleoalbuminous nature of some of the enzymes. J. R. Green accepts the same theory and practically demonstrates it in regard to the majority of the enzymes, in his book upon the subject.

"The agreement of enzymes with the protoplasm as regards ability of reaction toward outside influences, slight loss of enduring activity (degeneration), existence of an active, for a time inactive, enduring active condition, indicates, as the editor has shown further on, that it is about active albuminous material or about protoplasmic proteid."

In the following tables is seen the remarkable parallelisms that exist between the protoplasm and enzyme as regards their behavior toward light, temperature, desiccation, poison, etc. "How is this to be otherwise explained than by the acceptation that both consist of one and the same enegmatic material out of active protein?" The yeast contains in its protoplasm, according to the author, perhaps a dozen different plasmaproteids.

The name of the protoplasm or enzyme, together with the factors influencing its activity, might be given in the following form so as

to serve for a reference if needed when reading the table following:

A.—Name of the protoplasms or enzymes.

B.—The effect of light and temperature.

C.—Injury by means of desiccation and treatment with alcohol.

D.—Consequences of a separation from their natural admixtures.

E.—Acceleration by means of small additions of salts, acids, etc.

F.—Injury in general by means of powerful protoplasmic poisons.

G.—Effect of acids and alkalies.

H.—Effect of various antiseptics.

A.—**Bacteria and fungi protoplasm.**

B.—Nägeli found that bacillus subtilis could be boiled in water for eleven hours without notable injury. In a vegetative condition they are mostly killed by a temperature of 55°–60° C. Light also injures many bacteria (H. Büchner).

C.—As is known, spores withstand desiccation for a long time.

D.—Consumption of the reserve food makes the protoplasm more delicate.

E.—Small additions of phosphates, calcium salts, etc., act as nutriment, larger amounts (*e. g.*, 10 per cent.) are injurious and produce osmosis of the protoplasm. A feebly alkaline reaction is useful with bacteria, acid reaction with fungi.

F.—The bacilli of lactic acid are injured by 0·001 per cent. sodium fluoride (Effront); 1 per cent. of sodium fluoride absolutely kills putrefactive fungi. Mercuric chloride 0·1 per cent. is a sure disinfecting medium, kills immediately upon one application (R. Koch); 0·02 per cent. is usually sufficient. Formaldehyde kills all fungi in 0·1 per cent. strength, when it is allowed to act for one hour. Silver nitrate is not nearly so destructive as mercuric chloride.

G.—Fungi grew in acid up to 1 per cent. Most bacteria become sensitive when the smallest amount of acid is present; however, the bacillus of anthrax grew in a 1 per cent. solution of HCl for forty-eight hours. Bacteria grow in feebly alkaline solutions.

H.—With 0·002 per cent. (saturated solution) of oil of turpentine the formation of mould was prevented; putrefaction was only retarded. Carbolic acid 1 : 850 prevented the germination of anthrax spores (Koch) and meat-water bacteria (de la Croix). Carbolic acid 0·5 per cent. killed the anthrax bacilli; with an abundance of a 5 per cent. solution the spores were not entirely killed.

A.—**Protoplasm of yeast** (Saccharomyces and others con-

tained in the German yeast. The varieties grown considered by the author).

B.—Direct sunlight of long duration caused death. 25°–30° C. is the most favorable temperature for their development. Young vegetative yeast cells die at 50°–60° C., spores at 60°–65° C.; in a dry condition they will stand a maximum temperature of 125° C. (Kaiser).

C.—When dried they die, only the spores remaining alive.

D.—Consumption of the reserve food makes the protoplasm more delicate.

E.—Small additions of acid promote the development of yeast (*e. g.*, 0·002 per cent. sulphuric acid, M. Heyduck). Salts act as with bacteria and fungi.

F.—Budding yeast is a little more sensitive to sodium fluoride than bacteria; with 0·005 per cent. of sodium fluoride their fermentative activity was increased. Mercuric chloride 0·02 per cent. killed the yeast within twenty-four hours. Silver nitrate the same. Formaldehyde 0·1 per cent. killed within sixteen hours, 0·05 per cent. was very injurious.

G.—Beer yeast was not killed after remaining in 0·5 per cent. of sulphuric acid for sixteen hours, but the cream yeast was killed during this time of exposure. In 0·1 per cent. the beer yeast did not in the above time appear to have lost any of its generative power. Also injured in 0·5 per cent. of lactic acid; 0·5 per cent. o sodium hydrate is deadly within sixteen hours, 0·1 per cent. is not.

H.—Turpentine water (solution 1 : 75,000) destroyed the generative power within twenty-four hours. Thymol water (about 0·1 per cent.) killed the yeast within two hours. 1 per cent. of carbolic acid killed the pressed yeast within fourteen hours. Chloroform killed yeast; 10 per cent. alcohol was for a long time produced; 30 per cent. killed the pressed yeast within three weeks.

A.—**Protoplasms of the lower plants and animals.**

B.—Spirogyra was rapidly killed in water heated to 45°–55° C. Many species of algæ live in the Carlsbad thermal springs as well as the warm spring from Ischia with a temperature ranging from 53°–85° C. Sea-water animalculæ die at 35° C., fresh-water amœba at 40°–45° C. (Kühne). Too strong light is injurious.

C.—Spirogyra die in about twelve hours when in dry air (over sulphuric acid). Absolute alcohol kills immediately. Many lower

animals, as is well known, withstand the desiccation for a longer time.

D.—Through fourteen days of starving (in the dark), whereby the admixtures of the protoplasms are consumed, the spirogyra die (according to Loew and Bokorny, *Chem. Kraftquelle*, page 64). The protoplasm of spirogyra is very sensitive, due to the admixed lecithins.

E.—Sodium chloride acts upon the lower plants as before stated, calcium salts enhance the CO_2 assimilation. Caffein 0·1 per cent. or less produced rapid movement of the paramœcium.

F.—Mercuric chloride 0·005 per cent. kills spirogyra, cladophora, paramœcium and vorticella within six hours and 0·002 per cent. within two days. Small animalculæ are killed within twenty-four hours by a 0·005 per cent. solution. Silver nitrate is more powerful; even a dilution of 0·0001 per cent. kills many individuals of the named animal and plant species within twenty-four hours. 0·1 per cent. sodium fluoride kills the various algæ within twenty-four hours. Formaldehyde 0·005 per cent. kills spirogyra within a few days.[1]

G.—0·1 per cent. acid kills spirogyra within thirty minutes; a 0·1 per cent. alkaline solution kills it within ten hours. Amœba are immediately killed by a 1·0 per cent. ammonia solution, but not by 0·02 per cent.; 0·013 per cent. of lime water kills spirogyra.

H.—Ether or chloroform vapor kills spirogyra in a very short time. Absolute alcohol kills it immediately, 20 per cent. of which kills in a very short time. In 0·1 per cent. copper sulphate solution, according to O. Loew, the algæ remain alive for a longer time.

A.—**Zymase** (the ferment of alcoholic fermentation discovered by E. Büchner).

B.—At 25° C. fermentation succeeds the best; at 53° C. it is destroyed; at 0° C. it is not harmed.

C.—A dried soft-pressed yeast loses its fermentative capacity in about three weeks (E. Büchner). Exhausted yeast, when treated with a large quantity of absolute alcohol has, after eight days, some fermentative capacity when the alcohol is removed.

D.—Pressed yeast, when dried at 25° C. and triturated, retained its fermentative power for eight weeks; dried soft-pressed yeast for only three weeks.

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[1] For further information see Vol. 64 of this JOURNAL.

E.—Small additions of sodium fluoride act as a stimulus and intensify the fermentative activity.

F.—Mercuric chloride destroys in 0·02 per cent. amounts; silver nitrate 0·01 per cent. within twenty-four hours. Formaldehyde 0·2 per cent. is fatal within twenty-four hours. Sodium fluoride 1 per cent. is destructive, but 0·005 per cent. accelerates the action of the zymase.

G.—0·5 per cent. sulphuric acid destroys the zymase within twenty-four hours; 0·1 per cent. destroys it in five days, but not in twenty-four hours. 0·3 per cent. hydrochloric acid destroys in twenty-four hours. 1 per cent. acetic acid does not destroy in twenty-four hours, but in five days. 0·5 per cent. sodium hydrate injures in twenty-four hours, but does not entirely destroy.

H.—1 per cent. carbolic acid destroys in twenty-four hours; with 0·1 per cent. it does not. Water saturated with oil of turpentine destroys within twenty-four hours. 0·1 per cent. thymol also destroys within twenty-four hours. Chloroform does no injury within twenty-four hours. A small amount of copper sulphate has no injurious effect (Fiechter).

A.—**Maltose**, that is, glucose (in the yeast and other materials).

B.—Yeast maltose is destroyed by 50° C. (Lieber and Kröber). Corn maltose, according to Géduld, works best at 35° C.

C.—Yeast maltose does not stand desiccation.

D.—Injurious.

E.—0·02 per cent. sodium hydrate promotes the action of the yeast maltose.

F.—0·01 per cent. of silver nitrate or 0·02 per cent. mercuric chloride destroys in twenty-four hours. 0·1 per cent. formaldehyde injures in twenty-four hours; 1 per cent. destroys in twenty-four hours; 5 per cent. destroys in thirty minutes.

G.—1 per cent. sodium hydrate destroys the yeast maltose within eight hours; 0·1 per cent. or 0·02 per cent. has no injurious effect within twenty-four hours; 0·5 per cent. is not fatal within twenty-four hours; 0·02 per cent. even accelerates. 1 per cent. of hydrochloric or oxalic acid gradually destroys yeast maltose. 1 per cent. acetic acid does not entirely destroy it.

H.—1 per cent. carbolic acid destroys yeast maltose within twenty-four hours; 0·1 per cent. does not destroy it. Chloroform water does not destroy in twenty-four hours. Turpentine water

severely damages within twenty-four hours; 0·1 per cent. thymol destroys its fermentative power.

A.—**Yeast invertase** (invertin).

B.—With 70° C. moist heat it is rapidly destroyed; at 50° a longer time is required. It works best, according to A. Mayer, at 31° C.; according to Kjeldahl, at from 52°–56° C. (These statements certainly have reference to different invertases.)

C.—In entirely dried yeast there is still active invertin present. O'Sullivan and Thompson have prepared it from powdered beer yeast.

D.—The purer the invertase the more it is injured by alcohol (O'Sullivan and Thompson). And it is said to be easily dissolved out of the yeast by means of water. The invertase in cane-sugar solution can be heated 25° C. higher than the temperature at which it was destroyed in pure water (O'Sullivan and Thompson).

E.—The ammonia salts, even in higher concentration, accelerated the production. Very small additions of sulphuric acid act favorably (0·001 to 0·02 per cent., according to O'Sullivan and Thompson).

F.—0·1 per cent. mercuric chloride does not entirely impede the inversion of cane sugar, but 0·5 per cent. prevents it in two days. 0·02 per cent. silver nitrate does not impede it, but 0·1 per cent. prevents it entirely. 5 per cent. of formaldehyde does not destroy in twenty-four hours.

G.—1 per cent. sodium hydrate destroys the fermentative power in twenty-four hours; 0·5 per cent. does not destroy it even within four days. 0.5 per cent. sulphuric acid damages, but does not entirely destroy the fermentative power within twenty-four hours, hydrochloric acid acting the same. 1 per cent. oxalic acid does not perceptibly damage within twenty-four hours.

H.—1 per cent. carbolic acid does not damage within twenty-four hours; the same with 0·1 per cent. thymol. Borax damages. Even absolute alcohol does not destroy by an action of twenty days.

W. S. Weakley.

THE VALUATION OF CORTEX GRANATI.

Stoeder (*Pharm. Weekblad.*, 1902, 21) gives the following method for the valuation of this bark: Twenty grammes of the dry powdered bark are shaken well with 100 c.c. of chloroform and 5 c.c.

of ammonia for twelve hours, when 20 c.c. of water is added and the whole allowed to separate. Seventy-five cubic centimeters of the chloroformic solution are filtered (=15 grammes bark) and from the filtrate about two-thirds of the chloroform are distilled off. The remainder is transferred into a separator, and the flask washed with 5 c.c. of chloroform, and the alkaloids are shaken out with dilute hydrochloric acid. They can now be estimated by weighing and by trituration. The mean molecular weight of the alkaloids is found to be 147·5.—*Chem. and Drug.*, May 17, 1902.

EDITORIAL.

THE AMERICAN PHARMACEUTICAL ASSOCIATION.

The American Pharmaceutical Association enters upon the work connected with the celebration of its fiftieth anniversary with unusual enthusiasm upon the part of the members and with a more or less marked manifestation of interest by the pharmacists throughout this country. During the past year the pharmaceutical and drug journals have published numerous articles containing suggestions intended to benefit this association in adding to its membership and usefulness.

The presidents of the various state pharmaceutical associations are calling attention this year in their addresses to the coming jubilee meeting of this parent association. This is seed sown in places where it is likely to bear fruit.

Mr. Cliffe, President of the Pennsylvania Pharmaceutical Association, well said that, "At Philadelphia, commencing on September 8th next, there will be held the fiftieth anniversary of the American Pharmaceutical Association, the parent of all pharmaceutical bodies in the United States. If the aims and purposes of this organization could be reduced to a single phrase, it would probably be nearly correct to say that they were to make better pharmacists for pharmacy. For fifty years this association has gone steadily on in its allo ted work, leaving in its trail only that which reflects honor, profit and glory on American pharmacy and American pharmacists participating in its deliberations. There is no entrance fee charged, and the yearly d es of $5 are more than returned to its members through the publication of an annual report of its proceedings, which is a complete collation of the advances in phar-

maceutical knowledge for the year—a yearbook of pharmacy. It is a publication that any one practically interested in the application of scientific pharmaceutical knowledge to commercial purposes can appreciate at all times in the busy activities of his work."

The special delegates appointed by the President of the A.Ph.A. to the various state pharmaceutical associations are also active in attesting to the value of membership in this association. The address of Mr. Ebert at the recent meeting of the Illinois Pharmaceutical Association illustrates the point we have in mind. He said, among other things, "The history of the American Pharmaceutical Association is the history of pharmacy in this country. With the advancing years it becomes necessary, in order to keep up the life and vigor of the association, constantly to infuse new blood, to gain new and younger members to carry on the necessary and vitally important work of the organization. Membership in the American Pharmaceutical Association is an honor to be coveted by every pharmacist who respects himself and his profession. By allying himself with the organization, he comes in touch with the brightest men in pharmacy and keeps himself abreast of the latest and best scientific thought in his profession. Aside from all this, the annual reports of the proceedings of the association form a library of invaluable information to every pharmacist, each volume of which will be worth to him many times the sum of $5 he pays as the amount of his annual dues.

"During the many years of its useful life the association has met in nearly every city of prominence in America, and the social and entertainment features at each meeting are not the least of the many advantages which membership carries with it. Those who join the association and attend its annual conventions meet their brethren from various parts of the country, discuss questions of interest and combine business with pleasure on their annual vacations in a manner both pleasant and profitable, invigorating alike to the mind and the physique. We urge you to join and will welcome you as members, assuring you that, should it be possible for you to attend our meetings, you will find the outlay one that you will never regret."

The Committee on Membership, as well as the President, are very active in their endeavors to increase the membership of the association. Mr. Lewis C. Hopp, Chairman of the Committee on Member-

ship, has offered a prize of a $5 gold-piece to the druggist giving the best ten reasons why a druggist should be a member of the American Pharmaceutical Association.

The various other committees of the association are hard at work in their endeavors to make the Jubilee Meeting one of unusual interest and profit to all those interested in the professional as well as commercial welfare of pharmacy. In our next issue we hope to give some details of the plans that are being arranged. Suffice it for the present to say that all those attending the meeting will be given a most cordial reception, and that arrangements are being made for the most successful convention that the association has ever held.

PERSONAL NOTES.

PROF. S. P. SADTLER had conferred upon him, at the commencement of Gettysburg College, on June 18th, the degree of LL.D. *honoris causa*. He received the degree of A.B. from this College in 1867, and in 1870 he received B.S. from Harvard University, and in 1871 Ph.D. from Göttingen University.

DR. H. M. GORDIN, well known for his researches in pharmaceutical assaying, has been appointed Professor of Chemistry in the School of Pharmacy of Northwestern University. He was born in St. Petersburg, Russia, in 1860. He graduated from the University of Moscow in 1884, and then emigrated to the United States, establishing himself in San Francisco as a practising pharmacist, and after a few years of successful business returned to Europe, where he studied chemistry at Paris, Geneva, Munich and Berne. He graduated with the degree of Doctor of Philosophy at the University of Berne, Switzerland, in 1897.

DR. E. R. KENNEDY has been appointed Instructor in Materia Medica at the Philadelphia College of Pharmacy. He is a graduate of the Zanesville (Ohio) High School, of the Philadelphia College of Pharmacy and of Jefferson Medical College.

DAVID C. ECCLES, the newly appointed Instructor in Chemistry of the School of Pharmacy of Northwestern University, is the only son of Dr. R. G. Eccles, of Brooklyn, N. Y. He is a graduate of the Brooklyn High School and Columbia University; from the latter he has received the degrees B.S. (in chemistry) and A.M.

FRANCIS B. HAYS, associate editor of the *Druggists Circular* for eleven years, is now editor of the new publication, *Southern Drug Journal*, the first number of which appeared in April. With the reorganization of the South and the development of its industrial and educational facilities, the need of a drug journal representing its particular interests has been felt for some time. We therefore congratulate the editor and proprietors of the *Southern Drug Journal* upon the prospects and possibilities that lie before them.